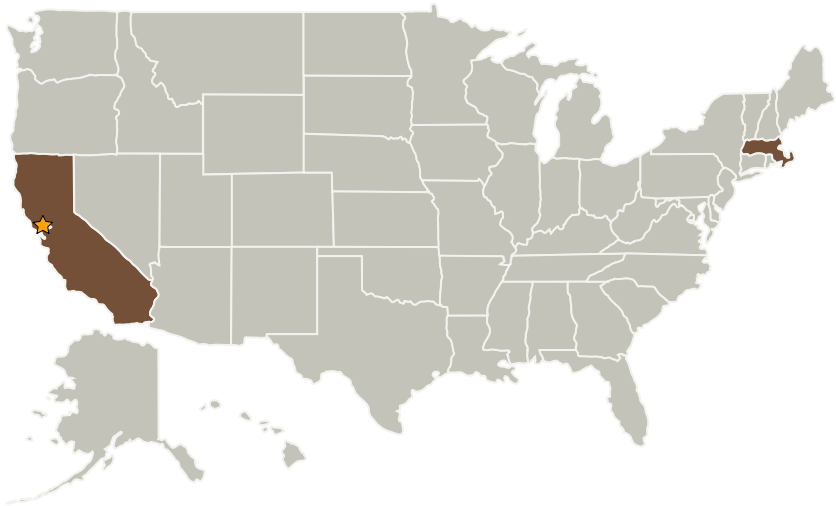
Coordinated Control of Multi-Agent Systems in Rapidly Varying Environments, Phase II

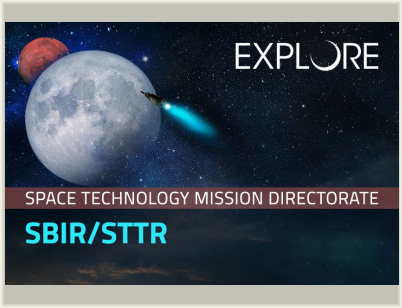
Completed Technology Project (2005 - 2007)

Project Introduction

The main objective of this Phase II STTR project is to develop advanced control algorithms that enable multiple autonomous agents to perform complex tasks in rapidly changing environment cooperatively. We plan to use the forest fire monitoring mission to demonstrate the benefits of the proposed technology. The mission concept involves using multiple Low Altitude Short Endurance (LASE) Unmanned Aerial Vehicles (UAVs) equipped with camera and wireless communication modem to monitor a forest fire. Advantages of using LASE UAVs for this mission include flexible deployment, capability to collect high resolution imagery data, more frequent data update to the ground crew, and significantly lower cost than existing means (e.g. manned helicopter). Since the fire monitoring mission shares many characteristics of future NASA space exploration or Earth observing missions that require autonomous control of multiple satellite or vehicles, the proposed technology is expected to be applicable in those missions as well. Our technical objectives for this project are: (i) Develop autonomous decentralized cooperative control scheme; (ii) Develop payload driven perimeter tracking algorithms; (iii) Develop autonomous data acquisition and rectification algorithms; (iv) Develop intelligent fleet management algorithm, and (v) Demonstrate the feasibility of the proposed system through flight tests on prototype UAV hardware.

Primary U.S. Work Locations and Key Partners





Coordinated Control of Multi-Agent Systems in Rapidly Varying Environments, Phase II

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Scientific Systems Company, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Woburn, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.3 Mission Operations and Safety
    - TX07.3.2 Integrated Flight Operations Systems